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AUG. 3, 1953

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Domestic

Failure of the left wing flap mechanism caused the RFA's T-12 Commodore Navy transport crash July 7 near Chanteco, Md. Investigation of Civil Aeronautics Board, the Navy and Lockheed Aircraft, builder of the RFA-1, discovered from the crash debris that the left wing flap was fully actuated, the other wing flap was 95% extended when the big ship crashed. "In such conditions," CAB ruled, "the plane became uncontrollable."

Fairchild's T-34 turboprop are going into seven airplanes of three West Coast manufacturers, five for the Air Force and two for the Navy. Orders recently have been confirmed for two Boeing C-47 transports to use the engines, in addition to four Lockheed Super Constellation-two each for USAF and Navy-and the Douglas C-119B. Other turboprop airplanes, which cannot be specified yet because of security, also will be powered by the engines.

General Electric Co. is reported to be building a large engine-assembly facility at Kowale, Ohio, for development and test of jet engine components. The new laboratory facility will be completed this year. Installations also will provide facilities for study of various factors related to jet operations.

Two USAF B-47s set separate unofficial speed records last week. One Stratojet clocked 2,935 mi. from Lancaster AFB, Mo., to Fairfax, England, in 4 hr 45 min, averaging 636 mph and breaking a previous B-47 mark of 5 hr 22 min. The other jet bomber flew from Goose Bay, Labrador to Pinetree in 4 hr 14 min, setting an average of 611 mph.

Cokeford-Eskom Air Lines incorporated by National Airlines' aerial chain to merge with Cokeford's up to four airlines by CAB and the White House, following last week's and agreements before the House.

Turboprop Vickers Viscounts operated by Trans-Canada Air Lines will be equipped with cabin pressure regulator systems produced by A/R Research Manufacturing Co., Los Angeles. The first U. S. firm to manufacture parts for the British transport. Each system will include a new controller that combines a differential pressure control, rate-of-change and cabin pressure selection in one box designed for installation on the cockpit instrument panel.



New Version of British Research Delta

First photo of British-built F.111A jet-powered research plane, which is designed to fly at supersonic speeds. It has a delta (X) wing configuration. The F.111A is scheduled to appear next September at the Society of British Aircraft Constructors' display at Farnborough, England.

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Armstrong Corp. has filed suit in Federal Court, Cleveland, Ohio, against the Wheelabrator Co. of Cleveland, alleging infringement of four different patents relating to detachable, reusable fittings for flexible hose lines, used extensively in military and commercial service. Armstrong says its hose manufactured and sold products worth more than \$50 million sales value under the four patents, not including sales of Armstrong licenses.

Magnetic memory device has been developed by Research Radar Engineering Research Dev., New York, in connection with GAO's plans to create a new small U. S. air traffic system. The device electronically stores flight plans and compares them with actual already filed. It is expected to be ready for test and evaluation this fall.

William C. Whitman, formerly acting head of the Research and Development Board, is filling the post of special assistant to the Secretary of Defense for research and development until Secretary Whitman makes the appointment, reported recently. William F. Ruskoff is working as the Secretary's special assistant for operations, a job formerly performed by the Operations Board.

Financial

Boeing Aerospace Co., Seattle, reports net profits for the first six months of this

year rose to \$9,173,473 from \$5,077,975 a year ago. Sales were \$116,999,387, compared with \$108,368,047.

Republic Aviation Corp., Farmingdale, N. Y., cards a net income during the first half of 1953 totaling \$1,739,801, a 42% increase over \$1,225,215 for the corresponding period last year. Sales amounted to \$18,179,571, compared with \$14,526,415. Backlog reached a total of \$8,055,497,415.

Trans World Airlines net income dropped 21% during the first six months of this year to \$2,655,136 from \$3,177,700 for the same period of 1952. Operating revenues were \$94,161,364, compared with \$71,755,668.

International

Experimental jet convertiplane will be produced by Fawcett Aviation Co., London, under a contract awarded by the British Ministry of Supply. The jet-powered convertiplane will be fitted by tip-blades jet action, powered in forward flight by twin Napier Eland turbojets.

BOAC's Comet took off safely Jan. 28 from the T-600 jet runway at Benbury's John Airport, where the jet transport landed, outside night duty center (AVIATION WEEK July 27, p. 16), and landed at South Gate International Airport two miles away.



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WHO'S WHERE

In the Front Office

William E. Douglas, chief of the branch at Douglas Aircraft Co., Donald W. Douglas, has retired from the Santa Monica, Calif., plant based. New director, Donald W. Douglas, Jr., vice president-military sales. **Nit Finkels**, vice president-commercial sales, and **Stanley G. Webb**, member of the New York Stock Exchange. **F. E. Ames** has been appointed vice president of Public Aircraft Co., Los Angeles. Other changes: **R. J. Wilson**, vice president-manufacturing, and **Walter E. McCarty**, secretary-treasurer.

Changes

George S. Gessert, formerly of CAVI Propulsion Engineering Co., has joined Aerojet Industries Inc. as secretary of the Engine, Propeller and Rocket Technical Committee.

James W. Wilbur is now chief of quality control for Flight Refueling, Inc., Dallas, Texas. **William Terry** has become assistant administrative engineer.

John Kautsch has been promoted to chief test pilot of United Aircraft Corp.'s Clinton Vertical Inc., Dallas. **Charles Mann** is now chief of military sales.

Alfred E. Fuchs, U.S. air officer in Tokyo, has joined Japan Air Lines as a consultant.

H. Gentile Verry has resigned as chief architect of CAVI's Office of Aircraft to join the Miami, Fla., architectural firm of Stroud & Moore.

Frederic Aitchison has been appointed director of transportation research of the Post Office Department's Bureau of Transportation.

Thomas L. Brown, Jr., control chief of USAF's post branch at the Pentagon, has become information officer for the Radio Technical Committee for Aeronautics. **Donald W. McDaniel** is now assistant manager of public relations and advertising for the Federal North. Central American and Caribbean Div.

James R. Quibben, former research and development officer at Wright-Patterson AFB, has been appointed plant manager of Torrington Co.'s Chicago plant.

Honors & Elections

Charles F. Howe, former Civil Aeronautics Administration and recently appointed manager of General's Pattern, Calif., Div., has resigned as vice chairman of the Radio Technical Committee for Aeronautics. **John S. Anderson**, president of Aeronautical Radio, Inc., has been elected to complete Howe's unexpired term ending Sept. 30, 1954.

William U. Wheeler, assistant controller for Glen L. Martin Co., Indianapolis, W. G. Carr, controller for Bell Aircraft Corp., Buffalo, N. Y., and M. A. Krasnowski, assistant treasurer-controller for Douglas Aircraft Co., have been elected members of Aviation Institute of America.

INDUSTRY OBSERVER

►Douglas X-3 is scheduled to get two Westinghouse J46 engines that are expected to boost the power of the world's fastest supersonic research craft sufficiently to smash the unofficial speed and altitude records of the Douglas Skyrocket by a sizable margin. The X-3 has made only six flights to date.

►Cessna's hydro-delta XF75-1 Navy jet fighter is going into the shop at Sea Darga jet engine to its flight test now being held at continuing tests. Charles Skyrider, who has been flying a Lockheed T-33 chase plane with the hydro-delta jet in earlier tests, is expected to take over the water-borne fighter's test flights from Sam Shannon, who takes over a new classified assignment—that the tests of the new Cessna delta-wing XF75-1.

►Comments from Southern California residents about male "boom" have caused aircraft manufacturers to order these test pilots to stay during places through the sonic barrier over populated areas. An industry meeting at which the order was agreed also produced agreement from engineers present that more knowledge is needed about the causes and effects of the "boom."

►Douglas Navy XF4D-1 Skyer, now powered with a Pratt & Whitney J57 jet engine, made an uncontrolled crash at Alamogordo, N. M., before it completed a transcontinental test to Patuxent River Naval Air Test Center. Stop was attributed to unexpected mechanical trouble.

►One reason USAF has been cautious about releasing photographs of the new North American response XF-100 jet fighter is the unconventional control arrangement of the plane.

►Navy is giving Douglas designer Ed Hennesman a chance to prove his simplicity theories in the new Douglas A-1J jet attack plane, which has won the nickname of "Hennesman's Bird." It's chosen the El Segundo plant. Work is starting at El Segundo on the prototype of the craft, stripped-down and simplified plane.

►Capt. Eddie Rickenbacker has been talking to Cessna about buying some jet transports for Eastern Air Lines. He is, however, among other things, that Cessna is planning a swept wing rather than a delta wing for its subsonic jet airliner.

►The United Propellers, Ltd., has completed a licensing agreement with Haviland Aircraft Corp. for manufacturing the Haviland Standard solid-air conditioning unit for high-speed jet aircraft cockpits and for its sale for use in British planes in the British Commonwealth and other foreign countries. American airlines two units, one for cockpit, one for baggage bins. The requirement made it necessary to achieve cockpit temperatures which get up to 140°F at 6,000 mph, much higher in the speed increases.

►British Overseas Airways and the French Union Aeronautique de Tunisie have received clearance to operate the Ghost turbojet engines in their de Havilland Comets for 600 hr. between overhauls. BOAC now is sending service tests on a batch of Comet engines for further extension of the overhaul interval to 750 hr. The 500-hr. period at Comet speed is the equivalent of flying 10 hours around the world, in the distance to the moon.

►An Medical Air. scientists are progressing development of a new-type cockpit warning device to "wake up" a pilot experiencing "night blindness" in areas types of over-orientation on a particular flight problem or control, while neglecting other items as his checklist.

►Aeronautical Aviation Service Co. has completed special modifications on two Cessna L-194s for the Airline Aviation Unit Co. The planes will be used as combination passenger-cargo carriers for the firm's Alaskan operations to supplement its passenger services with DC-64s and Constellations.

Washington Roundup

143-Wing USAF After All?

A significant twist has been dropped that the Administration is thinking. Initially at least, in terms of a 143 wing USAF after all—when the war starts.

Sen. Everett Roberts, chairman of the Senate Armed Services Committee and a key Administration member, observed, "It is very understandable that there is to be an interim Air Force of 120 wings, with an interim staff, determined provisionally for 1977, of a greater amount, presently 143 wings . . . but it isn't clear whether this is to be actual in 1966, 1967, or 1970."

Talbot's Outlook

Here are some trends from Air Secretary Harold Talbot's views in the USAF program.

- Automobile plants should be phased out of the aircraft picture in production levels. Talbot feels that aircraft firms have the know-how to continue producing in the field and should have sufficient assets to sustain economic operations.
- There should be a "go/no-go" policy on getting plants into production. This would cut down wastage involved in riding types out of the development stage prematurely.
- Liaison should be increased between Air Materiel Command and Research and Development Command. Talbot believes there is a big area for improvement here. But a merger of AMC and R & D commands is not in the picture, he reports.

Dricker: New Key Man

Sen. John Dricker, who takes over as chairman of Senate Committee Committee (which handles all congressional aviation matters) as a result of the death of Sen. Charles W. McNair, has concentrated on national legislation in his legislative activity. His only active role in the aviation picture, so far, has been severe criticism of Civil Aeronautics Administration for its air safety management last year.

On riding, Dricker has sided with the scheduled accident.

- He opposed a move to make critical flight air air, as well as main carrier, suitable for selection.
- He ordered long-term safety research for airlines so they might also operate safely.
- He opposed a move to set "cost" as the standard for streamlined and pay instead of the much higher than actual value of \$1.91 a minute.

Airline Investigations

General Accounting Office staff investigators are plugging through Civil Aeronautics Board records, as a start for GAO's review of airline subsidies. It was a GAO investigation a few years ago that brought out congressional air shipping subsidies and finally resulted in abolition of the antiquated Maritime Commission and transfer of its functions to Commerce Department. But airline subsidies Stuart Tipton, Air Transport Act's author, reports that airlines are uncontrolled. Decline CAA has moved on the side of "too little" in allowing airline profits.

See John Cooper, who heads the Commerce subcommittee making a thorough review of air transport law, has backed legislation exempting his service on the bill which would hold down mail pay for the scheduled lines. He is co-sponsor of the Kennedy bill, vigorously opposed by the scheduled industry, which would cut cost-of-service as the yardstick for determining both domestic and international pay and make it possible for Congress to vote subsidies to airlines, up or down, each year.

Edward Sweeney, who has headed all staff work on aviation for the Commerce Committee for the past few years, probably will participate as the Cooper subcommittee's staff. Sweeney, who first Sweeney has started paid for the scheduled industry, was named as it the appointment of Frank Korman as Cooper subcommittee staff man by the recently deceased Sen. Tobey.

R & D Investigation

Conference between Senate Appropriations Committee, led by Sen. Hiram Fong, and Air Force over whether "field test" or top scientists and engineers should direct the research and development process is developing. The committee are now looking into the "complex" background of all law officers in the command.

USAF thinks field officers with administrative ability more first-hand at staff assignments, with the assistance of staff of scientists and engineers after the last decision. Maj. Gen. Donald Yates put it: "It has been shown in the past that allowing research and development to be controlled completely by highly technical highly scientific personnel tends to build toward complexity, tends to build toward more and more refinement which will complicate and does not take sufficient consideration of operational requirements of the field operating forces."

But various dissent on tight military control. For years commented that there is a difference between the military telling the scientists what they want and the military actually, spending a half billion dollars on your research program.

Wilson Public Relations

Defense Secretary Charles Wilson's public relations program seems to be on last year. The Secretary reported to Congress on September 17, "I am trying to get a good example personally . . . I have not made any statements on my subject other than that neither here nor . . . On that, I get a lot of a simple statement."

The policy, however, is running into opposition in some congressional quarters. The Secretary declined to inform Sen. Margaret Chase Smith whether the Army had any strong reason in Western Europe as grounds it would "involve divulging vital information that would endanger the national security." Subsequently, a recent Army release disclosed that there were none and an implied Sen. Smith took to the Senate floor with this disclosure.

For some time now I have had serious doubt about the matter in which security was being provided by the Defense Department in between legislative case and more done so to assure some progress. My opinion is in this instance has certainly done nothing to lessen that doubt. In fact, it has increased the suspicion."

—Katherine Johnson

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Post-Korean Industry Outlook:

Military Plane Production to Remain High

- Defense goals will stand against new Red threats.
- But additional cutbacks are forecast for 1955.

No further immediate cutbacks in the already trimmed-down budget for U.S. air power in fiscal 1954 were anticipated last week as a study of the Korean (see below) Washington sources forecast that the \$7 billion allocated for Air Force and Navy Aviation hardware would stand without change. One explanation is that the paring back of the 1954 defense budget had been made in anticipation of the Korean armistice.

Realistically, however, the cutback for the 1955 defense budget is for additional cutbacks for both Air Force and Navy Air, if the Korean truce and armistice continue in effect and no new significant problems arise elsewhere. ■ **Korean Combat.**—McDonnell, Fairchild and Douglas are expected to be the major aircraft manufacturers in the Korean Theater. In the opinion of many sources, FEAF's work in planning down enemy planes and the effective ground support of U.S. troops make the difference that led to the armistice.

FEAF's record last, for three years, one month and one day of the Korean conflict up to midnight July 26, showed 835,862 sorties flown with a tally of 1,035 enemy aircraft destroyed, including 534 MIG-15s. In addition, 177 other enemy aircraft destroyed, 149 MIG-15s probably were destroyed of a total of 1,227 enemy planes, including 935 MIG-15s, were destroyed.

■ **U.S. Losses.**—In contrast, USAF losses reported by FEAF for the same period were 434 air casualties, only 64 from air combat, 258 from ground fire and 91 from other causes, and 365 personnel, including 31 from air combat, 235 from ground fire and 62 from other causes. In addition, 117 U.S. Marine downed planes were lost in ways 82 other planes of other U.S. Nations.

FEAF reported its losses and ground-attack planes destroyed: 1,107 bombers, 592 locomotives and \$1,967 supply vehicles.

■ **Navy Report.**—Navy and Marine aircraft flew a total of 272,052 sorties, the

Boxscore in Korea

On the eve of armistice in Korea (midnight July 26) Fairchild Air Force reported the following score for the 37 months of war with Communist planes:

	Destroyed	Probably Destroyed	Destroyed	Total
Communist total	1,034	177	1,211	2,211
MIG-15	534	149	683	1,331

	Air Force	Navy	Other	Total
USAF and attached units total losses	116	476	221	813
jet	91	218	95	404
prop	21	251	65	337
USAF total	104	445	117	666
USMC (above listed)	6	79	33	117
Other USN planes	8	54	21	83

Navy announced, and tallied total losses of 544 planes, including five lost in air-to-air combat. Complete scores of Navy kills on Communist planes were not available. Among best known are the first MIG-15 shot down by a Navy pilot Nov. 8, 1950; the five kills made by a Marine Corsair pilot on Communist night attacks planes, and the first strike by Navy Douglas F4D night interceptor jet, scoring B-29s against MIG-15 attacks.

Most Navy missions were low-level ground-attack and interdiction flights, and they delivered 138,515 tons of bombs, 273,403 rockets and 71,255,000 rounds of ammunition. ■ **Wilson Statement.**—Most authoritative lay in the future of air power defense spending was a statement by Defense Secretary Charles Wilson last week, following announcement of the cease agreement.

"We cannot expect any important reduction in defense spending in the near future as a consequence of the truce."

"Manufacturers, producers, suppliers and services need no concern regarding an abrupt reduction in requirements for military equipment, modern and services as a result of the truce in Korea. The continuing needs of the Department of Defense, including the military defense program, are such that current production plans will be continued and will not be in such a way that will take into account the changed Korean requirements."

Wilson warned that the end of fight-

ing in Korea does not mean the end of the threat from Communist aggression.

"This truce, therefore, must not be taken as any kind of a determination to complete the building of our defenses and to maintain them as long as need be. We must not be misled into the same complacency which followed World War I and II. The Department of Defense stands to move forward towards its objective of maintaining the effective strength of all our military services," he added.

■ **Quentin.**—Meeting-whether support or to future defense spending, however, came from Wilson's floor-day Department of Defense conference last week-end at Quantico, Va., attended by top military and military personnel from all three services, and visited by President Eisenhower.

Forecasts were that lower dollar cost and some new cuts in defense spending would be in order if a real peace became official. So much of \$750 million in a billion may be achieved next year as a result of the truce, Assistant Defense Secretary (Assistant) J. M. McNair said.

Much of this saving, however, is reported in reduction of ammunition expenditure and savings of combat equipment, elimination of combat pay, reduction of transportation costs, and in building down Navy aviation programs. This does not include possible savings by cancellation of equipment programs before planned levels.

■ **McDonnell.**—The Administration's program calls for keeping the three sub-

they services at a strength totaling more than three million men until international tensions are relaxed. Some Washington sources predicted that whatever military manpower cuts are made they would not be at the expense of the Air Force, which already has been trained down severely personnel-wise although it is continuing to expand toward the projected 145,000 men.

■ **Talbot Message**—Air Force Secretary Harold E. Talbot sent a message to the Far East Air Forces meeting "opportunities to such numbers of the continued in the personnel cuts you have played in driving the Communist aggression from South Korea and making them want a cease fire."

"While you earned the right to the agreement with more than three quarters of a million square miles of the world's surface forces against almost complete freedom from enemy air attack," he added.

Talbot pointed out the need for continued vigilance in Korea and about the Pacific theater, citing the more than 2,000 planes in the North Korean air force loaded up by more than 3,000 additional Soviet Russian planes downed in the first three months of the Korean war. Russian bombers could operate against Japan and the U.S.

■ **Air Bases**—Meanwhile, aviation observers expressed concern that the treaty is opening the way for construction and establishment of airfields in North Korea "for civilian use." It is pointed out that there is virtually no requirement for civilian airports in North Korea, but that this will give the Communists a pathway to increase the airfields for fighter MIG-15 fighter attacks against South Korea in the event hostilities are resumed. It will permit MIGs to be flown from fields north of 37 miles north of Seoul.

Observers is also lame made to the fact that USAF planes will not be able to fly in North Korea after the armistice so that a Communist offensive could be resumed in North Korea with no U.S. air intelligence of its attack.

Prospects for immediate airfields in Korea, South Korea and the Philippines are mentioned by the fact that U.S. is considerably behind schedule in this regard in meeting its allies in West and East Europe. Plans already are being made to shift ammunition depots downed by Korea to Germany. Another factor is shift ammunition stocks in the country are low and will require building to a more satisfactory level before production flows down, apparently. This will take time to overcome.

■ **Operational Cuts**—The Air Force operational figure of 150 million a year for the Korean conflict after little prospect for more cuts, observers point out

Final Air Victory

Capt. Ralph S. Parr, Jr., Storer pilot from Apple Valley, Calif., was credited with shooting down the last Communist plane of the Korean war, a two-engine Ilamov, both F-101 destroyed, 16 hours before the cease fire became effective. It was Parr's 10th victory in Korea, all the other being MIG-15s. Parr reports that the transport carried Communist troop officials were decimated later.

A considerable portion of the support costs of wings now stationed in Korea goes on, point in view. And while combat attrition has been less than in aerial operational activities in pursuit of the costs of operating an Air Force necessary as insurance against a new outbreak in Korea still holds legs.

Tiger-Slick Merger Forecast for 1953

Merger of the two major U.S. all-range airlines appears likely by the year-end, despite a month's delay caused by Civil Aeronautics Board chairman E. Mount Babbitt for CAB staff to the level. Flying Tiger Line-Slick Airways must first for their merger was filed last week.

Executive Babbitt has based orders to finish his initial opinion as soon as possible except if the CAB staff last week. The merger agreement of Flying Tiger and Oct. 1 is deadline for the CAB approval. Observers on the Board do not meet that deadline now, but the carriers say that a date of completion has been set that date is acceptable.

■ **Little Opposition**—All recent merger applications have gone through CAB proceedings in record time, and the Tiger-Slick merger appears set to get similar expedited attention.

The recent statement hearing lasted only 14 days. Only opposition came from American Airlines and United Air Lines. TWA opposed but failed to establish and showed no cross-commission. Eastern was an advocate, but failed to appear at the hearing. Northwest and Continental asked right of intervention but filed no evidence and did not appear at the hearing.

■ **CAB Staff Unanimous**—General for CAB Bureau of Air Operations has not revealed the staff's position, if any, to the merger. Counsel asked and was a month-end delay in filing a brief because of the late withdrawal of letters counsel and the fact that all material that the parties agreed to furnish after the close of hearing has not been submitted.

Bureau director Gordon Ross says the staff is struggling with the three big (uncontested) issues: cost, control and severe service assurance. The question of increasing existing aircraft has expired Dec. 31, and a number of other current issues.

■ **West Financial Stability**—Tiger and Slick will have 16 hours before the proposed merger of the U.S., but lack their passenger-carrying capacity. They have gone without it, but cite potential advantages from integrating substantial reduction of overhead, that would help them compete more effectively with the airlines with access to all types of air-carrier business.

In fiscal 1952, Flying Tiger got almost half its revenues from the Pacific, with \$12 million total, 39 million was Pacific, 58 million other contract services and 55 million revenues from night flights. Net profit was \$1.5 million.

In calendar 1952, Slick Airways reports that it grossed \$11 million from contract-carriage transportation and \$4 million on other services, but reported a half-million net loss for the year.

A Tiger director says that company stock will support substantial profits for 1953, largely on contracts, and developments in the field. Flying Tiger Line recently was named of its big Navy transcontinental supply contract.

Newark Airport Opens \$8.5-Million Terminal

Port of New York Authority officially opened a new \$8.5-million airline terminal building at Newark (NJ) Airport last week. It incorporates these features:

- All airline ticket counters are adjacent to the plane ramp. Airline crews, baggage and loading zones are along the routes leading to aircraft.
- Main building can be converted quickly and inexpensively into a remote service hangar large enough to house three Boeing Stratojets.
- Lobby has 50-ft. clear span and 16-ft. width. Additional 50 ft. is available on the end.

The destination was originally scheduled closure of 27 gates and has been converted to planes, including a sample of virtually every airline transport currently used by U.S. carriers.

AF Bills Canadian

Josephine Cochran's son of Edwards Air Force Base, Calif., when the carrier is acted as several speed records will be held to Canadian land.

Max Cochran flew a Canadian-built P-47, during the flight and was "checked out" prior to his first flight in an Air Force T-33 jet trainer.

USAF did not divulge what the cost of using air facilities would be.

Wilson Wins USAF Outback Fight

Senate approves \$5-billion cut, kills two amendments to restore a total of \$450 million to 1954 budget.

The congressional victory for Defense Secretary Charles Wilson's \$5-billion study in Air Force's 1954 fiscal budget was complete when the Senate, after long but uneventful debate, approved it.

Gen. Elbert Vandenberg's proposal to increase \$1.4 billion of the Wilson study, known as a long list, proved Vandenberg's proposal accompanied \$151 million on procurement funds for support and strike planes, putting the total of the \$1.47 billion.

A proposal by Sen. Hayden to add \$16 million for purchase of 200 B-47s was defeated, 10-40-55. It was sponsored by some Democratic members of the Appropriations Committee, giving it a Democratic cabinet from Sen. Herbert Hoover, Richard Russell, Pat McCarran, Dennis Chavez, Carl Hayden, Lister Hill, Harley Kilgus, John McGeehan, and Warren Magnuson. The vote was 10-40-55, the majority, made from Independent Sen. Wayne Morse, was unable

to secure the vote would put it out of balance.

On a third Senate showdown, a proposal to buy preproduction equipment in the letting of defense contracts to help surplus and economic-defense arms were mentioned on this, the vote finally followed an open pattern even by emergency session late Michigan's Republican Sen. Elmer Ferguson.

At issue—Only a few points were at issue on the \$1.47 billion defense bill.

■ The Senate approved a \$475 million USAF allocation for research and development, as recommended by Wilson.

■ The Senate approved \$1,194 million for Navy preproduction of aircraft and related contract. That was \$6 million below the Wilson estimate, but \$17 million more than the House allowed.

■ The Senate allowed only \$100 million for building up a stockpile of nuclear fuels and production facilities—half the \$100 million Wilson estimate which was approved by the House.

■ The plan to buy the use of defense contracts to value labor surplus and other local economic defense problems was also at issue. The House did not vote on the law.



SEA DART IN ACTION

Fast in-flight view of new Convair Sea Dart shows the jet's close link with naval hydroplane landing gear extended. View of Navy delta wing fighter drops down the SST's in a long line as it prepares to touch down in San Diego Bay. Convair design report that the plane's 60-day-carryout delta wing has a low drag even though the fuselage, wings, and stability throughout and power control. Hydroplane gear have a flat landing surface with clear shock strut mounted approximately three-quarters of the way back. SST's have been designed to take off and land even in low bar seas and from rough and ice. (Airline photo appears at Sea Dart in page 9.)



First Martin B-57A Makes Initial Flight

Martin's two-seat B-57A night attack bomber took to the air for 45 minutes July 26 on its first flight. Company officials called the flight "successful."

Powered by two J65 Wright Supercirc engines built by Buick Division of General Motors Corp., the light reconnaissance bomber is being built by Glenn L. Martin Co. as a license agreement with English Electric Co., Ltd. The B-57A is a modified version of English Electric's Canberra bomber.

The first flight came just 10 days before the B-57 was scheduled to undergo an official flight acceptance test, by AFOP at Middle River, Md., Martin's airfield.

Two Frederick-based crews, O. E. (Pete) Tibbs and George (Bud) Kallias, Martin flight test division, started the bomber in its first flight. They also will be in the cockpit during the Air Force flight.

Two B-57As have been produced by Martin thus far. They are the regular night intruder bomber, which the Air Force will use, or accept, as an tactical wings. Successive models covering the line at Baltimore will be training, photo reconnaissance and radar search models. Production is ahead of schedule.

Big advantage of the B-57 over the Canberra is said to be a better power-weight ratio of the Martin version.

Sayen Charges Some Pilots Flying 14 Hr.

Charging that some pilots of military contract carrier planes are flying as much as 14 hours without rest, Clarence N. Sayen, president of Air Line Pilots Assn., last week asked CAB to stop issuing its regulations based on the contract carrier's.

Sayen pointed out that Special Regulation 307, authorizing the CAA to authorize to permit the contract carrier to operate from standard Civil Air Regulations 43, 41, 42, 45 and 61, has been amended twice since its first enactment July 28, 1958, and is again up for renewal Aug. 1.

Blowback has for domestic air carriers for pilots to fly more than eight hours without a rest period. Inter national regulations permit two pilots plus a third relief man to fly up to 12 hours.

Sayen says that the airline now granted permits a two-pilot crew to fly "practically indefinitely."

He says if it stopped, to prevent the double standard of safety that now exists. If the airline were eliminated, it

would mean including a third relief pilot in the crew. He asks for public hearings, if there is any intention of granting approval of the special regulations.

Reds Claim Germans Plan Supersonic Craft

(McGraw-Hill World News)

The official Russian press has renewed its attack on a reveal of the aircraft industry in West Germany with the assertion that designers Willy Messerschmitt already is laying plans for production of supersonic aircraft.

The publication New Times said that Messerschmitt disclosed a three-stage program for a new German aircraft industry at a meeting of the Rhein-Ruhr-Klub, an association of Düsseldorf industrialists. First stage would include building of training plants of older types and designs from a family enterprise. Second stage would embrace construction of modern two-engine and four-engine transports "based on the experience gained by Germany up to the end of World War II." Building of supersonic aircraft would be the first stage.

New Times asserted that actually a fourth stage of German aircraft production is planned—construction of planes equipped to carry German-made thrust atom bombs.



LAST THUNDERBOLT

The first Republic Thunderbolt fighter-bomber to be built, No. 467, is owned now by USAF Col. Kenneth Garrett by Republic Aircraft Corp.'s president, Nando L. Fain (left), at Farmingdale, N. Y. In background is the Thunderbolt's successor on the company's production line, the new supersonic F-4H Thunderbolt. Thunderbolt is serving the USAF and 27 Allied air forces. The last Thunderbolt is the F-4H model.

MacCready is Champ At Glider Meet

Dr. Paul MacCready of Pasadena, Calif., has been named U. S. gliding and soaring champion for the third time, following competition of results at the 10th National Soaring Contest at Morris Hall, Elms, N. Y., July 2-16. MacCready scored a total of 1,399 points.

Second place was won by Stanley Smith, Longmeadow, N. Y., with 1,677 points and third place was given to Paul Schermer, vice president of Schermer Aircraft Corp., Elms, N. J., took fourth place with 1,506 points, and Edna went to Cande G. N. Goodhart, England, 1,275 points. New women's champion is Elizabeth Woodward, Ridgewood, Md.

The first, third and fourth place was won all five the new Schweizer 1-21D glider and the second place was won by the 1-23B and 1-23C. Smith piloted a Schweizer 3-21 and Goodhart flew a Luscombe Karioline.

Navy Air Chief Visits Carrier Antietam

Day before he was sworn in as Navy's new Assistant Secretary for Air, James H. Smith, Jr., was flown down to the carrier-ship carrier, USS Antietam, flying off Norfolk. It was the Secretary's first visit of a carrier since his Navy service during World War II.

The East Coast carrier arrived at the Virginia base July 22 following "highly successful" collaborative operations with the Royal Navy off Portsmouth, England, Navy spokesmen said.

Antietam, first carrier converted to control deck concept at a cost of \$2 million, is slated for further tests to determine if conversion is practicable. USS Forrestal (Aviation Warship No. 2, 2952, p. 18) is the first carrier being actually built with two control decks. It is about one-quarter finished at present.

S-56 Has 5-Blade Rotor

Sikorsky Aircraft's new large S-56 two-engine helicopter, contrary to some industry reports on the subject, will use the single-shaft rotor plus tail rotor configuration, characteristic of earlier Sikorsky machines. The large rotor will have five blades. The smaller tail rotor will be conventional two-blade design operating in a vertical plane and will not turn any of the blades. A reference to the helicopter in Aviation Week (July 13, p. 29) quoting these reports, incorrectly stated that the S-56 had two five-blade rotors.



LOADING bomb door does pilot is waiting away for attachment to bomber



ROTARY BOMB DOOR is shown approximately five-fourths of the way through the 180-deg. turn the door makes to place of door position so the bombs can be released

New Bomb Bay

- Pivoting door permits fast run over target.
- Off-plane missile loading is feature of the device.

Jet bombers may be able to maintain high speeds while performing accurate bombing runs as a result of Glenn L. Martin Co.'s new rotary bomb-bay door development.

The Martin X-51 has been fitted with the new door to test what may be the answer to high-level, high-speed bombing.

The new combat device is preloaded with bombs or rockets and fitted into the bomb-bay. Over target, the door is rotated 180 deg., placing the missiles in position to be dropped.

No Buffeting—That decreases air drag experienced with bomb-bay doors in conventional bombers. With the new rotary door, there is no swinging gap in the bottom of the fuselage in which the airstream can play wind-tunnel. Except for the time involved in opening and closing the door there is no apparent in the fuselage.

Big advantage is that no buffeting is experienced and that there is no need to slow down the airplane to obtain the required stable platform for bombing. By keeping the aircraft at top speed, it is not so vulnerable to enemy fighters and anti-aircraft fire.

The Martin rotary bomb door turns



SIDE VIEW of rotating bomb door loaded with missiles attached to Martin X-51 test jet. Door jet AV-14C tested support bomber. Door the door has not completed its 180-deg. turn.



TWO-TON BOMB is moved externally, other bombs are on door's reverse side.



ROCKET CRACKERS also can be fired. Door is fixed here in being position.

over rapidly. When in operating position, the bombs are externally carried, thus eliminating the hazard of a loose bomb in an open bay.

Tumbling, which usually occurs except with all but very large bombs, is prevented by two aerodynamic plungers which "kick out" each bomb at diagonally to the extension as a second plunging position. The ring on load at the time of release holds the bomb in a release arm until it is below the fuselage. Possibility of striking the nose of the launch vehicle as it falls out is thus eliminated.

► **Black-Burner-Warner** Buffalo and Albert T. Woodlief, Martin aircraft engineers, conceived and developed the door. It was patented by Martin in November 1952. The device will undergo months of testing before it is considered for installation in present jet bombers.

The bomb door is adaptable to both tandem and bombs of one size (up to 4,000 lb). Black-burner if black-burner are used, two can be raised externally on the bottom of the door. When these are dropped, door is retracted as bombs which have been carried internally can be released.

Lettering bomb door is a "B" type door which hinges out of the bottom of the fuselage so the bomb can be completely buried internally. The "A" type door is not as large but will accommodate all but the biggest bombs.

► **Locking-Out** of the repliers, the rotary door is mounted on wheels, modified, checked and fixed. Mounted beneath the plane, it is then locked into position by using three standard bomb bolts. It is forced into place as it can be involved on transoms at the front and rear ends. Electrical connections are made to the airplane's intercom circuit; the door is raised to allow

Speed Record

A Navy ferry pilot, in the course of a day's business, recently set a one-way speed record. But because it was inadvertent and not officially timed by National Aeronautics, it won't be counted.

LT. Cmdr. George H. Wheeler, Jr., pilot with Ferry Squadron 51, Norfolk, Va., flew from Norfolk to San Diego, Calif., and returned in 21 hr. 20 min. Total elapsed time between takeoff and landing at Norfolk after entering and clearing back at Norfolk, that morning, was 14 hr.

Wheeler delivered a Grumman F1F-6 Corsair to San Diego, picked up a Douglas D-55C Skyraider and flew it back to his home base to deliver to his superior that he had achieved a record. Total air mileage, 4,930 miles.

that all bombs are secure and then closed the bay.

Time for lowering a dead door and replacing a live one is short.

Riddle Reorganizes Top Management

New management has been moved in to oversee Riddle Airlines, aircraft carrier operating New York-San Juan and Miami-San Juan schedules.

William R. Boyd, former president of Florida-based Air-American Airways, brought in a new team to help deal with Riddle, president John H. Boyd. He'll be succeeded by John Riddle as president three months ago.

► **Finance**-Riddle's balance sheet of

May 31 shows negative working capital of \$179,000 (losses of current liabilities over assets).

An earned surplus deficit of \$219,000 indicates the steady attrition of recent months losses eating into net capitalization (total assets equity less the earned surplus deficit) was \$331,000 as of May 31.

However, Riddle had no long-term debt as of May 31 and has been drawing assets profits on its operations in some periods. The company earned \$22,000 during the first quarter, lost \$11,000 as of May 31.

For the 12 months ended May 31, Riddle lost \$12,200 on operating revenues of \$1,071,800. Of which \$1,466,000 was scheduled freight revenue.

► **New Teams**-Moving in with Boyd is vice president P. H. Moss, formerly of United Airlines. Also joining, treasurer D. G. Judd, formerly with National Airlines, and secretary A. H. McClen.

Director team include Boyd, Moss and McClen, and Fletcher Godfrey, W. H. Conley, George Martin, J. A. Perkins and Benjamin Turner.

► **Route** Applications-Riddle got its present U.S. Puerto Rico routes from Civil Aeronautics Board in 1951. The cargo carrier recently applied for several new routes.

They include:
• U.S.-Venezuela, from Miami, New Orleans and Houston via Coastal Airlines and northern South America points.
• Florida-California, via many intermediate cities.

• San Juan-Toronto.
• Earlier route applications on El Estero, U.S.-Brazil-Argentina.
• Southwest-Central States, via certified points of U.S. Airlines—another aircraft company.

Supercharger Vapor Fills Connie Cabin

Fuel of a supercharger in a Twin "World Airmen" Lockheed 748A Constellation shortly after takeoff July 21 filled the plane's cabin with acrid oil vapor smothering smoke. Airmen Weiss has learned.

The transport had taken off from New York's Idlewild International Airport last June and was at 14,000 ft over Montreal, Quebec, N.Y. when the incident occurred.

Because there was no indication on the temperature gages as to which of the two Allison engines was the cause, the crew disconnected both and the cabin cleared of vapor. The plane made a normal landing at Idlewild. Cause of the failure is being investigated.



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BRIEF TEST 'FLYING WING' TARGET

Designed to give jet pilots gunnery practice at high speeds, this 24-ft-span test target is being tested in England. Built by the Navy on Tinsley Ltd., Abchurch, Southampton, it features all-metal construction and is made of a plastic resin that provides strength in place of usual ducted struc-

ture. Note the sharply swept-back portions of the wing and the constant dead-end leading edge. The target has an air intake, as mounted at the upper end of its fuselage. It also is fitted with a parachute to meet landing after release from the test plane.



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Airmail Rates

Airlines' hopes to hold the price of airmail at 6 cents an ounce last month as Postmaster General Arthur Sweeney's move to raise both air and first-class mail one cent but rough going in Congress.

Republicans of the House Post Office Committee tried to block consideration of Sweeney's postal rate increase until next January.

Meanwhile, Air Transport Assn reported airmail volume has increased less than 1% so far this year, whereas it almost doubled from 1950 to 1952. Implication may be that an increase in airmail rates may result in volume and hence fail to yield the \$15-million revenue increase anticipated by Post Office.

In the first five months of this year, domestic freight carried 25.6 billions of pounds, compared with 28.4 a year ago and 37.4 three years ago.

pled to violate them in order to stay in business."

• **Sen. Hennings**, after receiving letters from North American Airlines attorneys and engineers in his home state of Missouri "I want say, on the basis of considerable evidence referred to by the parties from Alhambra (Spokane) and on the basis of the questions which he raised in his speech... I am compelled to express great concern over the administration of the Civil Aeronautics Act by the Civil Aeronautics Board."

• **Rep. Hennen**, gesturing of CAB action against North American and against California flower growers to cut air-freight costs by consolidating their cargo. "It seems to me that the CAB's actions in these cases are examples of an administrative agency assuming powers and prerogatives beyond that intended by Congress."

T35 Costs

An Force reported to Senate Appropriations Committee that \$25.3 million was spent in development and production of the Curtiss-Wright T35 turboprop engine. The project was canceled after delivery of only 17 engines, USAF said, "in order to conserve funds since the Air Force decided to rely on Navy developments in this area and future developments... indicated even higher performance engines were required."

Radar eyes see in darkness, storm, or fog

to lock this twin-jet fighter on its prey...



—the Douglas F3D Skyknight

Out of known come new aspects of the Douglas F3D Skyknight in action, downing Maps for the United States Marine Corps during advanced night and foul weather operations.

Designed for the U. S. Navy, the all-weather Skyknight flies at maximum

speeds, operates from vicinities carriers as well as small advanced airfields. A fully automatic arrangement of pilot and radar operator results in close contact between the Skyknight's modern radar search and fire control equipment to be operated with maximum efficiency

when against maneuvering enemy planes.

Performance of F3D Skyknight in action is another example of Douglas leadership in aviation. Power that can be produced in quantity to fly faster and further with a higher payload is a basic rule of Douglas design.



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JAL to Start Pacific Flights This Winter

Japan Air Lines plans to start trans-Pacific DC-6's service next winter in competition with Pan American, Northwest, Philippine and Canadian Pacific airlines.

Trans-Pacific Air Lines crew will operate the flights. United Air Lines is concluding an agreement with JAL to handle fuel service and maintenance on West Coast end of Tokyo-San Francisco route. JAL also will train stewards for the new airline.

JAL now has 1 billion yen (\$1,773,000) capitalization—partly through non-voting major contracts with former rival groups. Another billion yen will be contributed by the Japanese government.

How It Started—JAL stock was set up by government merger of various airlines two years ago and has flown domestic service since. Northwest and Trans-Pacific operations and maintenance contracts helped get JAL started and Trans-Pacific still operates JAL flights under contract.



B-47 CARGO SPACE

Prior to flight of the 1954s B-47s, Douglas MacDonnell AFB, Ill., to England (Atlantic World Base II, p. 3), the B-47s were converted their planes to determine where they could store loaded spare parts and other equipment. Photos show end and right side view of what they wanted out. Top picture shows an extra engine seat once being loaded down in the plane's cargo compartment, which has been cleared of metal brackets and other equipment. Photo (right) depicts how B-47 external fuel tank was used up to take cargo. Two more doors were used as the side. Physical drawing has been made and before long may be seen attached in the lower portion of the B-47s. This fuel tank section was not used on the key to Boston. Since Stratofortress carried engines and other material in bomb bays.

Rival groups separately merged with JAL.

• Osaka Shosen shipping company (OSK) have a longstanding operating contract with California Eastern Airway.
• Low Kailas shipping interests (IKK).
• Control in Dagestan—A financial-political battle apparently rages over how much participation each group does and will have in the merged company. JAL, associate director Yoshio Koyama told a San Francisco press conference that company stockholders have 140 million yen, OSK 50, and IKK 40. Another JAL source reported holdings of 330, 50 and 30 million yen respectively.

A source close to the OSK later said that group does not or shortly will have effective control with 400 million of the billion yen capitalization, while IKK will hold 100 million, and 35 individual JAL stockholders will share the remaining 300 million yen.

Some observers speculated that part of the disputed share stemmed from Japan's to incorporate stock market values, while others said the main reason was that relative participation by

the three groups is still unequal.

• Would Group IATA Group—Representing JAL management, and "for data, rates and safety regulations, we will follow the International Air Transport Association standards."

But, he added, "we confidently hope that... lines will be substantially lower and in from April 1954, to cope with the recent trend of air travel—more passengers at less fares."

JAL plans to open an office in U.S. office of San Francisco and a branch office in Honolulu. Company plans to start two Tokyo-San Francisco flights a week in spring 1954, with a fleet of four Douglas DC-6s. First flight was slated for delivery the end of last month.

JAL will start Tokyo-Oakland service at the same time, and plans to start San Francisco-Sao Paulo service soon thereafter.

Japan Air Lines sets its feet (now an DC-6) will be increased to seven Douglas DC-6s, seven Douglas DC-6 type, three de Havilland Hercules and two de Havilland jet Comet 2.

Lean Board Budget May Curb Staff Study

Civil Aeronautics Board cut cost \$50,000 from its present annual level of security—direct all in staff salaries.

Both House and Senate slashed \$30,000 from last year's CAB budget at \$14 million. The board must give an additional \$90,000, amount of the general salaries increase due to provisions from fiscal 1953 to 1954. That leaves a \$50,000 gap.

CAB plans to make the cuts quickly to avoid overrunning its budget in the early months of the new fiscal year that started July 1.

A few board members talk of eliminating some staff study and analysis. One member says there are more statistics being prepared than there are persons to digest and act upon what ever significance the figures may have.

Philippine Air Lines Cuts Group Fares

(McGraw-Hill World News)

Manila-Philippine Air Lines has suggested a group travel plan as its domestic routes whereby a party of five traveling together from the same point of departure to the same destination or over a 25% discount on round-trip tickets. The idea replaces the "family fare" plan used by the carrier during July-September for some years.

The group travel plan is effective only on Tuesdays, Wednesdays and Thursdays, the traditionally slack periods in Philippine traffic.

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Delta Convertiplane May Hit 700 Mph.

Radical craft mounts large coaxial propeller-rotor that swings from horizontal to vertical position.

By William J. Coughlin

Los Angeles—An unusual Delta-wing convertiplane is under private development by a group of California engineers, who predict that the prototype—now under construction—will be ready for test flight this year.

The convertiplane will employ a large coaxial propeller-rotor mounted at the nose, which can be swung from a horizontal to vertical position as the craft shifts from vertical to forward motion.

The development group is headed by Franklin A. Dobson, an associate of mechanical standards and development for special services in the aerodynamics lab of North American Aviation. Dobson formerly was chief engineer for the Hercules Day of Aeronautical Products, Inc., Detroit, and project engineer in charge of West Aircraft's wartime glider program. He worked as senior chief engineer at Brooks and Perkins, fabricator of airplanes at

craft plant, prior to joining North American.

Force Principles. The prototype under construction is a two-place craft powered by two McCulloch 1514 target engines, developing 73 hp each. Delta wing and the unusual propeller shaft will be the distinguishing features of the Dobson convertiplane.

"Although called an experiment, our vehicle is based on proven engineering principles," Dobson says. "It shows a new and simple way to combine the vertical lift-off of the helicopter with the high performance of the airplane."

Private Francis-Dobson has applied for patents on the design, a private project not sponsored by North American, although most of the design group are NAA employees.

The designers expect the prototype to achieve a maximum speed of approximately 772 mph in level flight, a maximum climb of 1,999 ft/min.

Although the Dobson convertiplane

is designed principally as a end result, Dobson says the design study has indicated that a military version of the unique craft might be capable of a top speed of more than 700 mph. Speed is limited only by available power since the propeller is in the forward position, he asserts.

Research Transition. One of the main design problems involved on the unusual gliding necessary to permit swinging of the propeller shaft around the transverse axis from vertical to horizontal position.

Dobson prefers to withhold details of the solution pending flight tests of the prototype, but it involves a series of lifts as well as a gear box.

Two struts, each with three rigidly mounted blades, will raise, lower, swing, cycle and differential pitch controls may be provided (although a commercial design calls for no pitch or cyclic controls). Connected with conventional airplane controls, these are expected to allow smooth transitions between vertical and forward flight conditions.

Classical Conversion. In operation,

Dobson Convertiplane

- Gross weight 1,100 lb
- Empty weight 660 lb
- Useful load 440 lb (70 gal fuel; 2 men or 350 lb.)
- Wing area 132.5 sq. ft
- Wing loading 8.33 psf
- Aspect ratio 2.0
- Rotor diameter 16 ft
- Rotor area 204 sq. ft
- Disk loading 5.47 psf
- Horsepower 124 rated 144 emergency
- Power loading 9.16
- Maximum speed level flight 772 mph
- Maximum speed level flight emergency power 887 mph
- Maximum climb 1999 ft./min
- Speed for max climb 60 mph
- Power required to hover 37 hp
- Min. power required 12 hp
- Endurance 2.84 hr
- Range 225 mi
- Max. takeoff speed power off 21.2 ft./sec

the Dobson convertiplane is expected to work like this: with the rotor shaft in vertical position, the craft will take off at a high angle of attack as power applied to the struts lifts the front of the ship. The craft will gain about 100 ft/sec until the rotor of gravity is below the rotor and then will begin its vertical climb. When vertical altitude is obtained, the propeller is swung forward while the craft accelerates until the wing can support the entire weight.

Although the combination of a delta wing and a conventional helicopter is not a novel concept during the vertical portion of ascending from helicopter to airplane flight, Dobson and engineers working with him believe the craft is new in design, with some of the details in development will overcome that difficulty.

With the propeller swung forward ahead of the point of the wing, the climb design is expected to give low drag and high efficiency at cruising speeds. When landing, island position is reversed; propeller swung back until forward speed is arrested, and a vertical descent is made. As ground is landing is arrested at 10 mph.

The delta wing used is efficient at high speeds and stable up to high angles of attack," Dobson says. "In the low speed range, where the delta would



SCALE MODEL of convertiplane shows propeller rotor position during forward flight.

be sufficient, the rotor provides lift and operation and high rates of climb.

"The method of takeoff, in which the wing is tilted up to a high angle with the rotor, sometimes coincides with the rotor downstroke. However, when moving on the ground, the aircraft has a low, stable center of gravity which gives maximum safety in landing."

Designed for Safety. The slowly rotating propellers are expected to result in quiet, smooth operation. Components of the craft are located in a fuselage below the wing in normal forward position. An extra experimental design called for a single pivot point but was rejected in favor of the triplane position.

Dobson cites as an important safety feature the fact that all parts of the aircraft are clear of the plane of rotation of the blades at all times. Landing gear consists of skids at the wing tips and two cowling wheels at the front on bogie wheels. The gear, using heavy rubber shock absorbers, telescopes into the fuselage. Retracting wing skids are expected to give a wide base to prevent overturning. Swiveling skids which will strengthen the craft during a side shift landing.

Dobson says safe power off landings can be made with both the wing and the rotor contributing lift for a 21.2 ft/sec maximum landing speed.

The design group expects the prototype to maintain flight on either of its two engines.

235-in. Range. Vertical stabilizing surfaces and rudders are located at the wing tips. Pitch and roll control surfaces, located connected to a conventional control stick.

"Wingspan of the prototype is to be 15 ft. with an overall length of 33 ft. 9 in. Rotor blade diameter is 16 ft. Height of the craft will be 6 ft.

3 in. Speed reduction calls for a 20 gal. fuel load, giving a 225 mph range and 3.84 hr endurance. Empty weight is expected to be 660 lb.

The delta wing, with its long root chord, sets in the main structural member of the fuselage. Engines and rotor gear are contained in the wing.

Delivery Landing. Dobson says the design effort has been concentrated on a model for the present craft, combining small size and rugged construction with safety, ease of operation and simple maintenance.

"Although the present model is designed for safe operation and simplicity rather than maximum performance,"

Dobson says, "it will have a cruising speed considerably higher than most of the two-place ships now on the market." The convertiplane will be small enough for the owner to land on his driveway and park on the grass, he adds.

Military versions under consideration include a high speed transport. Army (mechanical transport) and a bomber. Air Force reconnaissance type. Dobson says the military has expressed interest but has advised him to build a prototype before seeking contracts.

Prototype Program. Work on the prototype is underway. The gear box is 75% complete, wing is half built and the fuselage is "under construction," according to Dobson. The prototype will have a wooden wing with a star tailing fuselage. If all is successful, materials may use plastics in large quantities.

Majority of the mechanical design on the convertiplane is being done by Henry Smith, an engineer in the rocket motor development lab at North American. Aerodynamics of the craft is the problem of John Gathio, specialist of aerodynamics at the North American aerodynamics lab.

PRODUCTION

Experts Learn to Live With Titanium

- SAE reveals progress so far, problems ahead.
- Tight supply is forecast through next three years.

Industry experts who have worked intimately with titanium in a structural material look a close look at the metal recently.

This group—representative of titanium producers, aircraft and engine construction, aerospace and metallurgical—met at the Production Forum of the Society of Automotive Engineers' National Aerospace Meeting in New York. The wide field of operations they covered encompassed new material considerations down to detailed shop procedures for working the metal.

Purdue and group discussion brought out the following information on alloy progress with titanium now on hand and what problems lie ahead:

Availability

• **WHAT** is the production picture for titanium now and for the next few years?

Ram-Cro Titanium, Inc., is now working 16 tons of titanium ingots per week. Within a year, this rate will be increased to 30 tons per day.

Titanium Metals Corp. is producing up to 4 tons of titanium per day at present and expects to be at 30 tons per day this summer. The company's sponge capacity in 1954 is planned to be 7,000 tons, made up of 10 tons per day each from Titanium Metals and DuPont. Deliveries from a plant capacity of 22,000 tons per year in 1955 is being discussed. Expected actual production of sponge is 3,500 tons for 1953, 5,800 tons for 1954, and 12,000 tons for 1955.

• **HOW** tight is the titanium supply now and what one is expected in the next few years?

All of the companies appear to be pretty well loaded through 1953. It



NORTH AMERICAN AVIATION used 180 lb. of titanium in each F-82 they delivered.

looks as though titanium availability will continue tight through 1956. Air Force representatives also would like up most of the titanium produced, and two U. S. jet engine manufacturers could use the entire output. Evaluation quantities are, however, available for both defense and non-defense uses.

• **WHAT** is the proportion of alloyed to unalloyed grades produced?

This proportion has been increasing all along. At this time, Ram-Cro is the only alloy sheet producer and is making equal amounts of alloyed and unalloyed sheet. About 75 to 85% of bars and forgings are alloyed. Ratio of sheet to bar is 1:1 for Ram-Cro and 1:3 for Titanium Metals.

• **WHAT** are the chances for price reduction on titanium?

It is anticipated there will be a price reduction early next year after sponge production goes up and more scrap is recycled. Until now, since scrap could not be recycled, titanium could not be recycled, but Titanium Metals announced that it is now recycling its own scrap in the form of 1,300 lb. ingots containing from 70 to 100% scrap. At present it seems to one side the two scrap supply.

Ram-Cro is incorporating up to 10% scrap instead of none previously, expects to increase this. Amount of available scrap reflects directly on the cost of fabricated form.

Applications

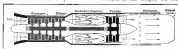
• **WHERE** is titanium being used in jet engines?

It is being used chiefly in the compressor, in disks and blades. It is also planned for use in sheet metal parts, rods in non-titanium chambers, liners, etc. The sheet metal liner is of welded construction and has to be made of an alloy estimated to require 120,000 psi yield strength at room temperature and 60,000 psi at 600°.

Current titanium alloy sheet in production does not meet the requirement of being ductile in the welded condition, but an experimental alloy—titanium alloy, Ram-Cro's RC A-118, now in pilot production, meets this requirement as well as the 60,000-psi yield at 600°.

• **WHAT** wheel materials are titanium alloys replacing?

Included in this category are mild



JET ENGINE: titanium reflects where titanium (shaded) has been used or investigated.



Wright Brothers' 1903 Flyer. Wright made the world's first airplane. For 20 years the Wright Brothers repeatedly built and flew a 10-horsepower airplane. For 20 years the Wright Brothers repeatedly built and flew a 10-horsepower airplane. For 20 years the Wright Brothers repeatedly built and flew a 10-horsepower airplane.

Their flight plan was "progress"...

What made this flight possible?

It was the way Wilbur and Orville Wright approached the problem. The Wright Brothers succeeded because they studied the basic principles of flight, then built a flying machine to fit these specifications. Their pioneering has made possible better and better flying machines, including today's jets. Their flight plan was truly "progress."

Esso Standard Oil Company supplied the fuel for the Wright Brothers' first successful flight. Since then, Esso Aviation Products have kept constant pace with aviation's rapid progress—the latest example being the recently announced Esso Turbo

OL 15. This oil is currently approved for the Pratt and Whitney Aircraft J-57 jet engine and the Curtiss-Wright J-65 Sapphire jet engine.

AVIATION PRODUCTS

Esso Aviation Products are available in all major markets. For more information, contact your local Esso representative.

WING SPAN *50 YEARS!*



DEC. 17, 1903—Wright brothers made first successful flight in 12-h. p. plane. Flew 852 feet in 59 seconds.

1952—Over 8,000-h. p. round-the-world winners take off regularly with Mobiloil protecting multi-million-dollar investment.



FIFTY YEARS AGO aviation was born. Fifty years ago the Wright Brothers called on Sweeney-Vaneman for the fastest to lubricate their aircraft engines . . . Mobiloil!

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pace every step of the way, right up to today's supersonic jets. As a result Flying Red Horse Products meet aviation's toughest tests . . . continue to be your assurance of top flight performance and protection, wherever you fly!

Mobiloil — *The Greatest Name in Motor Oil*

to be obtained. In addition to using a copper to steel gas backing, the trailing edge of the welding electrode must have provision for gas shielding in the solidification phase under metal inert gas.

• **WHAT** are the factors on chamber versus open-air welding?

Use of a welding chamber filled with inert gas could be provided in certain cases. First, in welding narrow configurations or in having low to wide transitions, an atmosphere chamber with carbon dioxide arc is extremely helpful. Second, in welding complex assemblies or in fillet welding, where the shielding problem is difficult, welding in chambers is justified. Once inert gas is used for each welding job, an atmosphere chamber which the work enters with suitable protective equipment. However, most production welding could be done in the open, using a gas shielded arc, if proper precautions were taken.

• **WHAT** is the effect of post-weld heat treatment?

It is a well-known stabilizing-type process can improve the ductility of some alpha-beta alloys. In some alloys, such heat treatment can be very effective. For example, using the post-weld heat treatment consisting of heating to 1,350°F, furnace cooling to 1,350°F,

and water quenching, yields an Ti-20Mo-8Al alloy made with high-purity sponge can be improved from no ductility to 60% RA and 40 ft-lb impact at room temperature. The strength of the work metal is treated in 100,000 psi.

• **WHAT** is the effect of constraints on welding strength?

The most gas must be of high purity to obtain maximum strength. Titanium alloys have not been completely stabilized, but ductility must be less than 5%, nitrogen and oxygen less than 1% (this is a purity of the welding atmosphere—not that is the gas tank before welding). Some alloys are required to be vacuum-purified a product to be avoided.

• **CAN** welded titanium be fabricated?

Yes—old welded titanium tubing is sold down, as much as 70% reduction in weight. Fining of welded titanium must be done but, however, ARE continuous welding processes, such as automatic, possible?

Yes. Was, both in industry and alloy grades, is available. The size should be picked before use.

Metal Removing

• **WHAT** causes grinding cracks?

The cracks are not known definitely, but it is believed alloys susceptible to heat treatment are more prone to such cracking.

• **ARE** grinding cracks more common in titanium alloys than in steel?

Yes. Titanium alloys seem to be more prone to cracking, and more care must be taken to prevent cracking in grinding. Use of decontamination grinding is helpful in removing, grinding, but the procedure is not preferred in all plants.

• **WHAT** are developments in position grinding?

Generally, it has been found that slow speeds of 1,000-1,500 rpm, and additives like wet lubricants (KNO₃) or graphite oils are greatly. However, standard grinding equipment is not for speeds of about 6000 rpm, and the wheel manufacturers have wheels and coolants which work under these conditions. Dry grinding is definitely bad, and the use of water cooling is almost as bad as efficient grinding is to be done. Keep grinding in water open dry, however.

• **WHAT** machining operations are used on a disk?

The forged disks are turned, holes are drilled and reamed, grooves are finished. No serious machining problems have been encountered, but some trouble still is being found with holes less than 1/4 in. in diameter and with some milling operations. Research no longer gives trouble, since the use of carbide insert breakers and CDA, using wire adapted. Tool life is no longer a problem. Carbide tools are required for machining the alloys. Research only are made of 45-55 min and finishing cuts of 1/32-1/16 in.

For each disk, rough turning requires 12 hr. and finished turning 27 to 30% more turning time for an 18-8 disk. A 200 lb forged disk becomes a finished disk weighing about 50 lb.

• **HOW** does machining of titanium alloys compare with stainless?

Taking a work hardened 18-8 disk as a specific example, a disk of the Ti-6Al-4V alloy (Ti-10Al) is about as easy to machine, and one made of Ti-6Al-4V alloy (Ti-10Al) is slightly easier.

The main difficulties were chiefly in selected work alloys that had high carbon content. So long as the oxygen alloy content is less than 25% C, they offer no particular difficulty. In machining facing heads, which are the most difficult, titanium alloys are preferred to 18-8, because they wear less.

Heat Treatment

• **WHAT** are stabilizing heat treatments of titanium alloys?

Heat treatments used in low levels to soften titanium alloys, are to

harden them. For alpha-beta alloys, the sealed annealing heat treatments are used to remove the alpha stabilizing hardening and embrittlement during service at elevated temperatures or in post-weld heat treatment to eliminate transformation hardening as a result of rapid cooling from welding.

The use of stabilization is to perform the transformation of beta phase to massive alpha as completely as possible.

This means that the transformation to massive alpha must be completed at an low temperature as possible. Stabilization is done by oil-bath holding at 1,100-1,150°F, or by actually heating at the higher temperatures to obtain an initial transformation of massive alpha and stabilizing beta phase, and by slow cooling to 1,000-1,100°F, to complete the aspect of massive alpha.

• **WHAT** can be done to harden titanium alloys by heat treatment?

Quench-hardening heat treatment appears to be valid only because of sufficient hardening and excessive embrittlement. Age-hardening heat treatment based on instability of the beta phase offers good possibilities. The aging process can be kept under control.

The most practical way to do this is through an alpha-beta solution heat treatment through which the stability of the beta phase is enhanced to the proper extent and then to age-harden the unstable beta-phase component at lower temperatures.

These heat treatments are in development and it is not known how controllable they are from heat to heat. It is predicted that the best rate practical benefits will be derived from such heat treatment.

• **WHAT** ABOUT heat treatment by radiation?

Surface hardening of heat treatable alpha-beta alloys by induction has been done. Blanketing at 40-45 K has been obtained.

—Ising Stone

ALA Compiles List Of Aircraft Metals

A listing of nearly 2,000 different types and sizes of metals specified in today's aviation industry has been compiled in a continuing initiative by the Aircraft Industries Ass'n's National Aircraft Standards Committee. The compilation is intended for use by aircraft manufacturers.

The list—expected to have reduced the number of errors that distributors and aircraft manufacturers are required to carry—was drawn up with industry collaboration to standardize and coordinate materials, with specs, hardness,

finish and size chosen to obtain best fit from the maximum number of types and sizes.

The catalog, Aircraft Metals Stock List, 1951, may be obtained from the National Standards Association, 127 Washington Lane & Trust Bldg., Washington 4, D. C. Price per copy (in lots of one to five) is \$50, with lower prices for larger quantities.

Japanese Jet Engines

(McGraw-Hill World News)

Tokyo—The Japan Jet Engine Co. has been established by three Japanese firms

and is scheduled to start designing aircraft turbojet powerplants by September.

Founders of the new company are Mitsubishi Heavy Industries, Fuji Electric and Fuji Precision Industries. Capitalization of the new venture is estimated at 300 million yen (approximately \$440,000).

Appointments have been made to the Japanese government for study to help develop the company during the next two years.

Following engine design and test, the new firm will develop and produce and be involved in the parent companies.

HOURS CHANGE TO MINUTES IN A

Hiller Helicopter



PERFORMANCE (maximum)

Ground Speed	60 mph	Service Ceiling	10,000 ft
Top Speed	44 mph	Range	100 miles
Rate of Climb	1,500 ft/min	Endurance	2 1/2 hrs

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WINGS FOR THE B-37

Wings for the Martin B-37 Flight Intruder—An F-40 version of the English Electric Canberra bomber—now being shipped from Kaiser Metal Industries, Inc.'s Bristol, Pa. plant to the Airline's Baltimore facilities where the airframe is mated with the fuselage in the final assembly line. Photo taken in KMP plant shows wing's long, wide span which will house Wright

R-58 engines. KMP's contract for engineering, tooling and production of the wing was signed late in 1951. Company entered 150,000 sq. ft. facility and tooling plant for the job. KMP has subcontracted fabricated parts to 150 different manufacturers, who supply more than 1,000 steel for the B-37 wings. The B-37's made its first flight July 23.



Illustration—Mr. Ransley
High speed Engineer in
Burlington, Iowa Standard
uses operation of ARO
Hydraulic Press for stress
on work.

These are typical of hundreds of assembly jobs performed by ARO Air Tools in the Douglas Aircraft plant at Long Beach, Calif.—in many demands for high speed, efficient production!

Do you have similar production problems in screwdriving, nutserting, grinding, sanding, drilling, sawing, etc? An ARO Field Engineer will gladly help in engineering your job or contact your Aro distributor.

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Illustration—Mr. Ransley
High speed assembly work in
screw assembly work.

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LONG BEACH DIVISION



Illustration—Mr. Ransley
High speed production
models range from
100 to 17,000 S.P.M.

Illustration—Mr. Ransley
Vertical
forces assembly work
same capacity, high
power in production
model.



ARO AIR TOOLS

ARO—LONG EQUIPMENT HYDRAULIC EQUIPMENT...
AIRCRAFT PRODUCTION...GREAT FLEXIBILITY

Aviation Week Picture Brief



FRONT VIEW of French P.A.49 shows experimental plan's delta wing and jet engine on left or either side of fuselage.

French Delta Shown at Paris

The tiny P.A.49, which made its public debut at the Paris Air Show, is the latest product of French aircraft designer N. R. Paves, who has been turning out experimental designs around the delta wing for approximately 20 years.

The new French P.A.49 is a lightest version of a model he set prepared for the French Air Museum in 1949 as a light fighter.

Of all wood construction, metal covering, the P.A.49 spans some 17 ft and is approximately 9 ft long. Wing sweep reportedly is 78 deg. Powerplant is a single Turbopropeller Paves of approximately 350 hp thrust fed from its intake on the leading edge of the fuselage wings. Another intake of the inlet, placed

in a light turbine, is designed to take no 250 lb thrust Turbopropeller engine.

The P.A.49 has completed its wind-tunnel test program. Design delta shows a top speed of 250 mph and a landing speed of 41 mph. Maximum lift reportedly is obtained at an angle of incidence of about 40 deg.

Fuel capacity provides for approximately 40 min of flight duration and auxiliary tanks can be installed.

One of Paves' early designs, which flew in the middle 1930s, was a small plane powered by a 400 hp General Motors. In addition to a simple swept delta wing, it had a horizontal tail mounted ahead of the wing, control surfaces



PROFILE shows how cockpit goes into vertical tail. Landing gear has main wheel under fuselage. No balancing struts are visible.

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PIPES**



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Wright International Division

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Navy Contracts

The following contracts were announced recently by the Navy's Aviation Supply Office, 730 Robbins Ave., Philadelphia 11.

Aero Rupture Mfg. Co., Inc., 441 West Main St., Corpus Pk., St. Louis 8, Mo., \$24,600.
Aircraft Mfg. Co., Inc., 41 Carroll Corp., 1111-1113, Broadway, NYC, 2nd Av. Station, value under \$10,000 for various aircraft \$22,000 to \$25,100.

Barber-Corbin Co., Portland 32, order for 500 500 500 aircraft to be \$22,000.
Seattle Aviation Corp., Seattle 220, 12200
Western Way, South Ballwin, MO, 12200
Seattle Aviation Corp., 12200
P.O. Box 12200, 12200
Seattle 220, 12200

Boeing, Seattle 220, 12200
Boeing 220, 12200
Boeing 220, 12200
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NO SAFETY GOGGLES?

Medium shop workers at Lockheed Aircraft Corp. are wearing the special plastic open eye protection system flying metal portions from lathe, grinding, milling and cutting machines. Again it is a bonded glass cloth polyester resin mat about 1/4 in. thick, weighs less than 1 lb. This lightweight device was developed by Lockheed safety engineers. It is considered under license for commercial use by E. F. McDonald Co., Los Angeles. Did the casual worker lose safety goggles put for the photo?

AVIONICS

EXAMPLES OF ELAPSED TIME SAVED BY USE OF IBM-CPC'S

STRESS:

SECTION PROPERTIES
YC-125 FUSELAGE

14 WEEKS

4 BEAR CAL.

26 WEEKS

F-80A FUSELAGE

5 WEEKS

4 BEAR CAL.

17 WEEKS

F-80D AFT. FUS.

2 WEEKS

4 BEAR CAL.

10 WEEKS

NO. 1 WING

1 WEEK

4 BEAR CAL.

8 WEEKS

WEIGHTS:

F-80 ALL MODELS
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THIS IS A CONTINUOUS JOB IN WHICH THE FOLLOWING ADVANTAGES ARE REALIZED:

1. CONTROL BOOKS ARE CURRENT
2. BETTER ACCURACY
3. 50% SAVING IN MAN HOURS

F-80D MOMENT
OF INERTIA

0.5 WEEKS

4 BEAR CAL.

13 WEEKS

DYNAMICS:

F-80 DYNAMIC LOG.

0.5 WEEKS

4 BEAR CAL.

13 WEEKS

MATRIX ROOTS AND
MODAL COUPLING

0.5 WEEKS

4 BEAR CAL.

13 WEEKS

CHART prepared by Northrop shows typical savings that can be effected by use of IBM Card Programmed Calculator

Northrop Pioneers Computer Technique

Faster solutions result when engineers work directly with machines, depend less on mathematicians.

By Philip Klass

Northrop, Calif.-Northrop Aircraft has stepped into the veil of mystery which usually surrounds automatic computers and large computers at a special distance, facing them in a special way, through "mathematical machines."

The Northrop computing center operates on the theory that engineers who understand the computer as well as the problem to be solved are best equipped to run engineering problems on automatic computers.

Company experience shows that this engineer-computer familiarity increases the usefulness of the machines and frequently produces engineer-suggested

changes to computer design. For example, the computer value of the Card Programmed Calculator produced by International Business Machines Corp. was developed at Northrop, according to L. A. Olin, chief of the company's computing service.

Mathematicians at Northrop have since the first big automatic computer, mathematicians have served as middlemen between the engineer and the computer.

Only mathematicians understood the machine's strategy, leaving number systems and their unconvoluted overhead methods of computation.

When an engineer had a problem for the computer, he "brought it to the

house of the computing deity and barely asked the questions of the priests for help." This is how Olin describes the procedure originally used at Northrop and generally used elsewhere today.

If the problem was one the computer could handle, the engineer left it with the mathematicians and waited to his desk. Some days, weeks or months later, the engineers was called back to receive his answer. The solution might show a new design approach was required, revealing another problem for the computer and another long wait.

These delays were not the fault of the mathematicians. Programming a problem for a computer is a time-consuming process and this resulted in poor computer utilization and large backlog of computer work. It was little wonder many engineers were re-



NORTHROP'S "SUPER C" enables two C-FCs to increase computing speed by



INTERCONNECTING modules transferring channels to double electronic storage



MADEIRA, a Northrop design, has an accuracy of one part in 160 million

give the IBM calculator the ability to execute what is called "logical choice." That is, the calculator is able to measure the results of its previous calculations to determine how it should proceed in solving the problem. This combination of programmed operations and logical choice greatly increased the versatility of the IBM machines and their output, Ollinger says.

IBM recognized the worth of the Northrop idea, built a prototype machine, and flow it out to Northrop for test and evaluation. One of this has been the recent IBM Card-Programmed Calculator (C-FC).

► **The Pappe-Northrop found that the increased speed and versatility of C-FC made it possible to take on a great many more engineering problems.** For example, many of the problems involved in airplane design are so complex engineers previously had to be content to solve out of five individual cases and extrapolate from these results, Ollinger says.

With the new C-FC, more cases could be solved in the same time to provide enough data to bracket the entire design region, according to Ollinger.

"The beauty of this new engineering tool was that it was relatively simple to operate and could be handled directly by engineers," Ollinger says. In addition, the cost of C-FC is well within the reach of the average engineering budget, he adds.

► **New Northrop Developments—More recently, Northrop engineers have devised a means of increasing the output of C-FC by a factor of 4 to 15 in many problems, and by a factor of 50 to 100 in special problems.** This increased output makes overall equipment costs by only a third, Ollinger says.

What Northrop has done is to add a second electronic computer, Type 604 as 605, and interconnect it with the existing electronic computer, to double the internal storage of "memory" capacity of the system.

Could be this idea, which Northrop calls its "Super C," goes to Rex Rice, Jr., a former computing coordinator now senior chief of computing section. "This development came as a result of an engineer's familiarity with the equipment through actual use. It is doubtful if it would have occurred if the engineer had had to work solely through mathematics or computer operation," Ollinger says.

► **New Programming Techniques.** Ollinger also credits Rice with developing new internal programming techniques, which have cut down some problems where time took 15 hours on the old unprogrammed calculator to three minutes on the latest Model II Card-Programmed Calculator. The techniques are used in speed computation

on vector properties, their flows, and normal stresses in multibody wings for example.

Northrop is constantly acquiring its problem programming techniques, Ollinger says. However, when a problem cannot be solved to fit existing machines, Northrop doesn't hesitate to alter the machines or to design new equipment to handle the problem.

► **Computing Facilities.** Northrop's computing center has been one of the country's largest collections of computers, including:

- **Fast Card-Programmed Calculators.**
- **Disc Systems.**
- **One fixed, very high speed digital computer on business from the USAF.**
- **Five Novacs, Northrop analog computers.**
- **Two Enacs, Reeves analog computers.**
- **Two Rans, Boeing Airplane Co. analog computers.**
- **Six Nalacs, Northrop analog computers developed by and named for Dr. L. L. Naloff.**
- **Two Madalacs, Northrop-developed digital differential analyzers.**

Northrop expects to replace these soon with a new computer which Ollinger calls "Novac" built by an undisclosed manufacturer. Ollinger expects Novac to turn out much more work than these, despite its lower internal computing speed and pulse rate. Since very high pulse rate (5 mc) has raised many maintenance problems, Ollinger says, and its small memory and slow input-output speed limit its versatility.

► **Training Ground.** Northrop's non-military activity is a training ground for personnel from industrial and military computing centers, Ollinger says. Northrop also receives many requests to perform outside work which it takes on when its own heavy internal workload permits.

Computer Research Corp., a growing producer of small digital computers, got its start at the Northrop computing center. The five men who formed the company three years ago came from Northrop where they had developed the Madalac computer.

► **Future—Ollinger would like to see computer designers and implementers work more closely with computer users in diagnosing new computer designs. However, engineers must learn more about the machines and their use if they are to be able to provide wise counsel, Ollinger feels.**

"Computing equipment will have a far more profound effect than a constructive point of view upon our environment for reshaping long periods (physical) conditions of life at large's also," Ollinger says. "Improved stability, through artificial means, controlled very important for all weather should be available (able) to derive full attention to combat distress."

automatic computers within five to 10 years.

► **Automatic factories in many industries within 15 years.**

► **Automatic management.** Automatic business plan financial and budgeting operations, billing and payment by computers within 20-25 years.

Two years ago these predictions would have been called "science fiction." Ten years from now, we may look back at these as being far too conservative.

FILTER CENTER

► **GE Developing Helicopter Damper—General Electric is developing a shock and roll damper system for trial on a Pruck helicopter.** Ollinger says to determine whether a lightweight damper system can provide a helicopter with fluid wing aircraft stability and eliminate the need for heavier structures. The damper is being developed at GE's Avionics and Customer Services Division.

► **Interscope Tinkens-USAF B-29s are being outfitted at Hughes Aircraft with interceptors for tactical systems.** The B-29s will be used to train Air Force interceptors and operators and pilots without using up B-29s, B-57s and F-4Ds.

► **New Lightplane Autopilot.** A single-engine autopilot is under development at Senneca Aerospace Co. of Santa Monica, Calif., while the company now will develop a helicopter on a deceleration or level to pitch attitude. Most of the new autopilot will be an integrating rate gyro arrangement which provides both rate and displacement signals. Senneca, which produces thousands of autopilots for small target drones, estimates that the autopilot should sell for approximately \$5,000 per unit.

► **New Navy Autopilot.** Navy BuAer's new advanced lighter type P-4 autopilot, the result of a four-year development at Telopha Research Division at Redwood, Australia, is currently undergoing flight tests.

► **Artificial Stability.** Cornell Aeronautical Lab is working on a passive system in the field of control systems with pitch dampers to provide improved air plane stability. One of these is a damper for stabilizing long-period (physical) conditions of life at large's also," Ollinger says. "Improved stability, through artificial means, controlled very important for all weather should be available (able) to derive full attention to combat distress."



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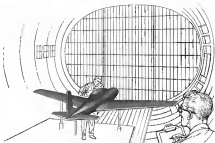
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Already recognized for its record low-cost production, TEMCO Aircraft Corporation is building for the future with cost-conscious design.



DALLAS, TEXAS

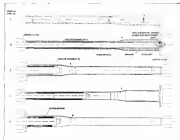
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NEW AVIATION PRODUCTS



MACHINING a jet engine shaft on Alling HWF 1800 shown in schematic diagram. Dashed line (Stages 1 and 2) indicates metal to be removed by the German boring machine.

Boring Tool Improves Accuracy

Wider latitude in design of jet engine shafts, rocket tubes and probe components requiring intricate ground internal bores is claimed possible with a German boring machine which enables a single means of tooling the boring bar within the component. The equipment, developed by Nibbel, Fritz Alling A. G., is the descendant of a machine used by the Germans in mass production of jet engine shafts during World War II, according to its U. S. distributor, Mancy Machinery Co., Inc. It is being used by Armstrong Siddeley and other British firms. The Americans also picked up an early model after the Germans' defeat, the company reports.

Long Bores—The machine can produce shafts of longer over-all constructive and less boring job, consequently most "design around." Mancy says it avoids the need of pricing to gather components from distant areas and bolting. It can make repeated passes within the shaft and fine profile about any contour within the reach of the cutting tool arm. Work is to very close tolerances, according to Mancy, and a shaft is produced which is said to be better balanced, lighter in weight and stronger. Moreover, the machine is said to do the job faster and at lower cost.

Another plus factor cited for the equipment is that it can get into smaller shaft

openings, since the cutting tool retracts within the bar. For purposes of strength, shaft openings usually are smaller than the diameter to be hollowed out, the company notes. The present machine has a stroke of 95 in. but could be adapted to handle larger shafts, Mancy says.

Bar Support—The key to the tool's



CUTAWAY shows section of work from shaft through open and boring operation.



INTERNAL FEATURES are machined to a fine finish by Alling boring machine.

performance is the novel method used in centering and supporting the boring bar within the component to be bored. Support is given the bar along its entire length—right up to the edge of the cutting tool. Support is always present regardless of irregularities and constant variations of the internal surface on which the boring must rest.

Lack of support is one of the serious limitations of internal boring under conventional methods, Mancy notes. For example, one method is to rest and support the boring bar by means of a bar or backing. But the backing must have a smooth surface to ride over. This can be used for milling concentric grooves at the end pins of the machine in cutting and as an irregular contour. But it is said to allow no second pass.

Plastic Matrix—Repeated passes can be made with the German machine through variable plastic, or matrix, which serves as a backing. The plastic is poured into the already rough-bored shaft, leaving only a hole (concentric with the outer diameter) big enough to prevent entrance of the boring bar. The plastic is applied by a spiral machine and hardens in five to 15 seconds.

A fixture centers the work and permits accurate placement of a slung bar (same axis as the boring bar) around which the plastic or matrix is poured (see schematic, stage 1). The slung bar is removed, leaving a hole large enough to accommodate the boring bar with the cutting tool retracted (stage 2). Then, a boring is provided along the bore, the cutting length, usually eliminating defects. A new bearing on the machine gives additional support outside the component.

In machine, the bar retracts and the cutting tool enters while a cam moves the component shaft along its longitudinal axis, enabling the cutter to trace a profile the length of the shaft in one stroke. As the cutter penetrates, it lifts away the matrix support as it machines the part. The tool nibbles away, its own boring, but always leaves support for the bar right up to its tip (stage 3).

Metal chips and matrix are washed out by high-pressure coolant which sprays in a groove around the outside of the bar and sprays out at the cutting tool. Chip removal by this means is said to be an experimental new method, usually used and provides a clean surface that permits finer finishing, Mancy says. This positive support gives the boring bar stability in the machine to take full advantage of tangential outside cutting tools, the company adds.

After a pass, more matrix can be poured into the shaft and the process repeated. Cautions can be arrived at gradually by repeated passes, permitting

high accuracy. For this reason, a drop belt on the last pin (the last one with maximum usage a leading to support the bearing) is not necessary.

The machine moves the component shaft along its longitudinal axis, drawing it away from the bearing but without rotating the cutting tool. The latter is extended to the work or retracted by hydraulically actuated shaft within the bearing bar.

► **Template Control—Movement of the cutting tool is in direct proportion to that of a slide valve in contact with a profile template. The slide valve returns itself to both sides of a piston. Movement of the piston in one direction causes the drive shaft to extend the cutting tool, in the other direction, to retract it.**

With component moved to original position, final pass can be made on master and (Stage 4—black brass indicator matrix support remaining). After shaft has been covered again to its secondary position, the final pass is made on the legs (Stage 5).

Many believe this machine, or something very similar, with its high accuracy, minimum-defect characteristics, most certainly be adopted by American jet engine manufacturers if the consistently high performance demands on jet engine components are to be met.



Radial Pressure Kit Supplies Two Systems

Lee's Warner Div. has developed a Hi-Lo pressure kit for use with a constant inlet and air pump but designed to provide separate pressures to two distinct systems.

As is the common inlet of the equipment, Model 30L-5170, is dehydrated and passed directly to two pumps located in series. From there, the pressure line divides, one pipe discharging oil and compressor air to the high-pressure outlet, the other to the low-pressure side.

The 15-hp unit utilizes high pressure results through a combination of absolute pressure switches, a relay and a solenoid valve. The solenoid is energized by current controlled by the door switch and opens or closes the air line to the low-pressure side. A signal

switch warns of excessive pressure drops. Pressures are 45-47 psi absolute for air outlet, 13-17 psi for the other.

The equipment is capable of pressure from 1 psi to 40 psi. It contains 45-47 psi at 10 in. or less in an ambient pressure of 20 in. Hg. absolute and with a leakage of 15 cc in 1 min. The two air gauges employed are 1/5 and 1/15 psi, 27 x 1 in. model.

Ramco Div., Lee, Inc., Elgin, O.



Light Avionics Flowmeter Uses Few Vacuum Tubes

A new flowmeter system for aircraft weighs only 5 lb and consists of only two additions with standard 14-in. dual doors and a small vacuum unit. It has been placed on the market by Potter Avionetics Co.

Most of the tubes used in previous systems have been eliminated, the company says. Enough use of magnetic amplifiers. The flow tubes, however, are operated well within their capacity for maximum rated life. The sensitive circuitry makes for greater simplicity and requires less heat.

The complete system consists of a flow sensing element, flow rate indicator (reading in cubic pounds or psi/cu in) and a totalizer indicating unit. The latter two components are mounted on the instrument panel in standard 14-in. case, four inches deep.

The flow sensing element produces a 4-v output, with frequency proportional to flow. The element may be very accurate Potter relating more suitably used for system test and research work. Sensing elements are available with capacities as low as 0.1 gpa, and as high as several thousand.

The flow rate indicator electronically converts the 4-v signal from the flow sensing element to a proportional d.c. output which is received and indicated in rate of flow. It can be used with the totalizer as a stand-alone unit.

The totalizer, built to the same dimensions as the flow rate indicator, registers the total number of output pulses generated by the flow sensing element, divided by a factor of 12. The indicated reading is multiplied by a constant factor to obtain volume of flow.

Systems are available for operation

on either 400-c, 115-v, a.c., or 24 v, d.c. power. Cost, exclusive of the Flow Sensing Element, is \$350. The rate indicator is priced separately at \$450. Potter Avionetics Co., 37 Academy St., Newark 3, N. J.

New Hydraulic Valve Automatically Bleeds Air

Manual bleeding of hydraulic systems to remove air is said to be eliminated with use of a new automatic self-bleeding valve to appear soon on the market.

The valve was developed by Nathan Adler, Brooklyn, N. Y., who expects it to bring greater safety and accuracy to hydraulic system operation and reduce maintenance.

The valve is constructed adjacent to the entrance point of the hydraulic cylinder. Two valves, therefore, are required for every double-acting cylinder and one for every single-acting unit. Only one valve is needed for hydraulic brake systems, Adler says. The new device is to be made for all standard size hydraulic lines and in all pressure ranges.

Nathan Adler, 3857 Kings Highway, Brooklyn 14, N. Y.

ALSO ON THE MARKET

Color applicator for machinery, automotive, aircraft and electronic fields in bench-type, hand-operated, but also can be furnished as foot, power and motor driven models. It uses synthetic rubber painting the molded to match the materials, letters and design of the die. Bonded to a metal plate, the die is easily accessible, replaceable and adjustable. Printing speeds of 20-50 cm/min can be obtained if it is cleaned.—Accomack Co., 315 Maxwell St., Elizabeth 4, N. J.

Section and discharge base for all kinds of petroleum products is reinforced with two layers of bonded armor clad plate and high tensile spring steel wire, the layers separated by one in rubber friction to reduce internal churning. Available in 16-in. to 36-in. inside diameter sizes.—Dexter Rubber Corp., Division of H. K. Porter Co., Inc., Philadelphia, Pa.

Miniature gage pressure potentiometer for remote measurement of hydraulic and pneumatic pressure is compact and rugged possibly have 1-watt output, are actuated by flexure of Bourdon tube which moves against one on zero-watt continuous element. They weigh 2 oz.—Davis Laboratories, 6115 Maplewood Ave., Riverside, Calif.



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AND, THERE'S ANOTHER SIDE TO THIS "COMPOSITE MAN," another complete news service which complements the editorial section of this magazine — the advertising pages. It's been said that in a business publication the editorial pages tell "how they do it" — "they" being all the industry's front line of innovators and improvers — and the advertising pages tell "with what." Each issue unfolds an industrial exposition before you, giving a ready panorama of up-to-date tools, materials, equipment.

SUCH A "MAN" IS ON YOUR PATROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.



McGraw-Hill PUBLICATIONS

AIR TRANSPORT

Nonsked Crashes Keep CAB Probers Busy

- Irregulars have had year as skeds set safety record.
- Non-airline accidents run about the same as 1952.

By Lee Moore

Civil Aeronautics Board's 26 field investigations are as busy this year as last, despite record scheduled airline safety during the first seven months of 1953 (Aeronautics Week, July 28, p. 79). Reverses. Nonsked airline crashes occurred during the period, non-airline flying accidents ran about the same as a year ago.

Another factor is that while air safety per mile flown generally continues to improve, increased amount of flying and faster planes tend to keep total number of serious accidents about the same.

Wash. Lead—However, CAB's Accident Investigation Bureau (chief, William Anderson, last cost field office from 19 to 10 since 1946, field investigations from approximately 35 to 26, and total be personnel from 110 to 90. Expense rose, improved investigation techniques and faster personnel investigation have heightened CAB field efficiency.

Peak investigation load of all time across the U. S. was 1947 when the short land portion boom in private flying produced 9,251 accidents, compared with 3,807 in 1952 and 3,410 in 1953.

Some CAB members, trying to fit into their fiscal 1954 budget, recently got paid closing field offices, sending investigators to jobs from one central office another. But critics say the plan appears to be dead now, although the Board has not made a final ruling.

1953 Record—Place in the statistical run-down of 1953 safety record is due, compiled from Air Transport, Acc., CAB and National Business Aeronautics statistics.

Schedule loss' passenger-fatality rate dropped from 1952's record low of .9 to a new low of .35 for fiscal 1953. Flying activity gained about 24%.

Nonsked loss' credible safety record of two fatalities per 100 million miles in calendar 1952 has not extended as seen in fiscal 1953. Another disaster this July prompts in bold their calendar 1953 accident statistics at a higher level.

Non-airline loss' serious accidents requiring investigation ran about the same as a year ago, but major accidents



KEEPING TABS on field investigations posing plane accidents, this map in CAB chief investigator James Freyer's Washington office shows whereabouts of 26 men making on-the-spot investigations of 68 airline and lightplane mishaps during a typical month.

declined. Activity of business and experimental flying gained about 15%, while private flying (no statistics available) probably stood about even, industry sources estimate.

Here are highlights of recent accidents as far as the issue as revealed by information available at CAB in Washington.

Fatal Crashes

Scheduled Airlines—Consolidations of fatal accidents of certificated airlines as passenger flights this year:

• Gulf of Mexico, National Airlines DC-6 Feb. 14. Ferry on fuel-tanks, no survivors. The plane caught a violent storm over the Gulf and crashed. Navy and Coast Guard salvaged a wing at a distance from main wreckage.

Wing broke in air at Bureau of Standards in Washington for analysis, which was used whether cause was metal fatigue, material defect, water impact or wing gap lead that caused structural failure in flight.

• San Francisco Bay, Western Air Lines DC-6B Apr. 20. Near fatalities, one survivor. Plane started on the short San Francisco-Oakland hop with trouble clearing that permits such flights at a maximum of 500 ft.

Reputed ceiling was higher than 500, but more helicopters reported were visible above 300 ft. The survivor reports that the plane appeared to be flying properly but struck the water.

• Merrill, Tex., Delta Air Lines DC-3 May 17. Numerous fatalities, one survivor. Plane was tries to raise a lake thunderstorm before it crashed.

Fatal accidents of certificated airlines on non-scheduled flights:

• Los Angeles, Western Air Lines DC-3B two flights after major overhaul June 30. One fatality, two survivors. On itself, the plane dropped in right wing 300 ft. The right wing broke off and a propeller blade snapped on the runway and struck through the plane, killing Western's chief mechanic. Plane crashed, crashed over and burned. Evidence indicated that almost 400 lbs were around on overload, causing severe control reaction.

• Des Moines, Ia., Recruit Airlines C-46 delivery flight May 22. Two fatalities, no survivors. Secret flight instructor went in the area. Evidence indicates that the left stabilizer, right wing and several ft. failed in flight.

• Cargo Airlines—An cargo crash that resulted fatalities.

• Bismarck, Wash., Flying Tiger Line C-54 ferry flight Jan. 7. Seven fatalities, no survivors. Approaching Boeing Field, Seattle, the cargo plane departed from instrument pickup approach pattern and hit a mountain 11 mi. from the Seattle cargo station.

• Combs, Conn., Stick Airways C-46 May. 4. Two fatalities. Approaching Bradley Field on an ADF instrument approach, pilot reported over the water crash. Plane hit trees and ground com-

abruptly left of course between the radio market and the report.

Evidence indicates there was no in-flight trouble. Ceiling was 10,000 ft, with clearance at 500 ft. Visibility was one and a half mi., with rain and fog.

• **Standard Airlines-Fatal crash and other passenger accidents of irregular current**

• **Fish Hawk, Mo., Associated Air Transport C-46 military contract Jan. 7.** Forty-one fatalities, no survivors. En route from Seattle to Cheyenne over rugged mountains, the plane reported routine cruising at 11,000 ft. Ceiling was 1,000 ft. The C-46 hit a mountain about 5,000 ft.

Investigation indicated that the plane hit in a high-speed dive, but no evidence of mechanical malfunction was found.

• **Alameda, Calif., Transcon Air Lines DC-4 military contract Mar. 20.** Thirty-five fatalities, no survivors. Plane hit a report at 3,500 ft on overcast night. Ditched. But about immediately thereafter, witnesses saw it from place of reporting was the plane "falling" with wings almost vertical and nose high, in a violent flip. It crashed nearby.

No evidence has been found to indicate what caused the DC-4 to "fall out" of the cloud layer in this attitude.

• **Selkirk, Wash., Western Airlines DC-3 Apr. 14.** Seven fatalities, 18 survivors. En route from Spokane to Seattle over rugged terrain, plane reported losing one engine and encountering icing conditions. At last contact, the transport

was down to 4,500 ft. and losing altitude fast.

Evidence indicates the other engine was buried out by the time the plane hit. Evidence also shows that both propellers and plugs were maintained properly.

• **Star, Wake Island, Transcon Air Lines DC-4B military flight July 12.** Fifty-eight probable fatalities, no known survivors. En route from Wake to Honolulu, plane made a routine report 100 mi. east of the island while cruising at 120 knots at 15,000 ft. between cloud layers. No emergency report was received. Flights in the area reported high temperatures. Radar recorded showed evidence of violent upset, but no sign of the (aircraft to early press report).

CAR events arrived in Japan of Japanese fishing fleets located in that part of the ocean at the time. If there were no confirmation, the boats still were in report as severity of the conditions in the area and possible other evidence with possible direct bearing on the case.

• **Norfolk Island, American Air Transport C-46 Apr. 23.** Two fatalities, two survivors. Approaching Seattle from Cheyenne, the plane got clearance from air traffic control to cross the Hobart air corridor at 5,000 ft., then came over to Seattle at 4,000 ft. But the pilot reported his communications with air traffic control—1,000 ft. over Hobart. ATC replied "negative, negative," and repeated both the correct

clearance. It was not acknowledged. C-46 hit the top of a wooded ridge at approximately 300 ft., 14 mi. east of Olympia, at Hobart. The aircraft just a half mile from the scene of an earlier March Airlines DC-3 crash.

• **St. Louis, Midwest Air Transport DC-4 May 24.** Six fatalities, one survivor. Approaching St. Louis from Trenton, N. J., pilot was cleared for an ILS approach to Lambert Field. One minute later he reported loss of one engine. This was the last radio contact. Tower operators saw the plane come in low over the airport in a left turn and disappear beyond the eastern edge. The DC-4 crashed 2,000 ft. from the North-South runway, just off the airport. All four main engines had. Ceiling was 400 ft., visibility three mi.

Non-Fatal Crashes

While fatal airline accidents capture headlines, CAR investigations are pushing a mountain of non-fatal airline and non-airline crashes, mostly light planes.

Here is the year's tally of airline and non-airline accidents reported to CAR in Washington.

• **Scheduled Airline Crashes:**

Colonial DC-4 on route to Bermuda. Jan. 23 suffered lightning damage, and crew mistook it for engine failure and crashed. No survivors.

Norfolk Carver 240 landing at La Guardia Airport Feb. 6 dropped to from approximately 100 ft. when a passenger went into flat air service pitch. The crash washed out the plane, but



TOP U. S. AIRMEN MEET TO DISCUSS AIRPORT NOISE

Top officials of the National Aviation News Conference gathered in New York during a recent meeting in Washington, D.C., where they discussed current transport aircraft problems being tried in the New York area. The new technology (Aviation Week July 15, p. 56) shows considerable progress of reducing noise measures. They were told. From second, left to right: Clarence Ryan, president of Air Line Pilots Assn., Allen DeWitt

Ransay, president Aircraft Industries Assn., CAA Administrator Fred B. Lee, committee chairman, Allen Charles E. Rosenthal, executive director of National Air Transport Coordinating Committee, Allen Young S. Land, president Air Transport Assn., standing, left to right: Col. J. F. McCabe, USAF, Allen Burke, ATN Group Pull Air Cdn Transport Assn., S. B. Rife, chief of private plane branch, CAA, V. G. McQuay, AIA,

Larry Carr, ALFA, M. William Nordeen, CAA personnel branch, Albert J. Fure, committee chairman, J. D. Smith, ALFA, Rando R. Hines, American Miscellaneous Assn., Fred Rutter, U. S. Conference of Mayors, Capt. H. F. Folger, USN, J. B. Hartsch, Jr., Aircraft Owners and Pilots Assn. Also participating in the meeting was G. C. Thompson, executive secretary of Airport Operators Council.



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'Six Times Safer'

A spokesman for the Association of American Railroads boasts that train travel last year was 64 times safer than scheduled airlines, despite the all-time safety record of the air transport industry.

The railroads sang up a perfect passenger safety record in 1972—not a passenger killed—and we congratulate them again on a great achievement.

We want the airlines to attain perfection, too. But we doubt that the railroads' reference to air safety sounds worse than it is, because in studying both industries' records we are dealing with astronomical percentages that cut the average passenger's risk to a minute figure, and we think the American public knows it.

In calendar 1972, for example, the domestic airlines' fatality rate was .38 per 100 million passenger-miles, and in the most recent 12-month period computed (ending June 30) it was .45.

If our industry maintained the latest safety record for the rest of the year, it would take the average passenger nearly 2,000 years before he would encounter a fatal accident, even if he made a trans-continental flight every week.

This is a chance race of us will take—since if the railroads continue to produce they are several times safer. Who wants more than 2,000 years to live, anyhow, especially if he has to spend most of them on trains?

Unleash Those Airliners!

This will sound like those stories at the dawn of the jetson era, but it must be told again. History is repeating itself in these days of record traffic volumes.

About 40 of us passengers were sitting in a modern twin-engine jetliner in Washington the other day, ready to start a morning flight to New York.

The pilots were abound. So were all the passengers. But then attendants began making the rounds, demanding to see our tickets all over again. There was, it seems, one less ticket stub than passengers. It was almost 15 minutes later before we were ready to go.

It's an old story to the industry—time troubles delay us on the ground—but a careless passenger sent to a windowed view the airlines pay thousands of dollars for each extra mile-on-time minute used in any airline when a \$60 a week ramp employee still can—and frequently does—add 15 minutes to each passenger's scheduled 70-minute journey.

A 70-minute turn from ramp to ramp between Washington and New York produces an average speed of 164 mph over the 215-mile airway. An 85-minute trip cuts the speed to about 152 mph.

What does the passenger care about extra speed in flight if the pressure is washed out sitting on the ground waiting to start? As far as he is concerned, his trip started when he entered the airplane and it lasts that much longer than his timetable tells him it will, whether he is in the air or not.

An educational program for ground attendants, instead

of a course in counting tickets, should be considerably cheaper than buying a fleet of new airplanes that will travel faster—but only after they are permitted to wait.

Genius at Work

Under the headline above, *Aviation Week* will begin soon to publish reports of interesting, important or unusual activities by companies or individuals in aviation who have not been well publicized in the past.

We have been receiving tips and information from readers since we announced recently that *Aviation Week* would give publicity to those whose services or products are unusual or outstanding, or which perform unique or especially valuable jobs. Publicity may be not necessary for you to get a worthwhile or interesting story in *Aviation Week*.

Just something that such news is most avidly read which is unique, little known, quite different, or reports opportunities for the economy, time saving, or new industrial or business possibilities. Your information must be important to many businessmen or technical people—not just a handful.

It's not too late to write us. Here's an opportunity to use publicity for your company. Write to *Aviation Week*, 330 West 43rd St., New York 36, N. Y.

Novel Viewpoint From Britain

An unconventional British viewpoint on aviation is expressed by a newsletter in England, and copies are being circulated throughout the U. S. aircraft industry.

The newsletter says government subsidies for transport prototype development are now as much a part of United Kingdom policy as they have been for military planes.

"With few exceptions, the private prototype company owned their aircraft to government sponsorship," says *Aviation Report*. "Whatever may be said about the virtues of free enterprise, there can be no denying that it has been one of enormous public cost and with no end of aviation disasters. There is a long list of ventures that have blown, or seem likely to blow. Little or no commercial return compared with the tens of millions spent on them—Tudor, Shepherd, Solent, Blackburn, Phoenix, Marston and Apollo, for example."

The letter points out that in their original prototype configurations none of the three turbine types, Comet, Viscount and Britannia, settled down favorably.

"Well before the Comet 1 was in service it had been proved to cut at short and go for the Comet 2, and now before the Comet 2 is in service, the Comet 3 project is being asked to provide the enhanced combination of capacity and range."

The publication also cautions in concluding millions of pounds more for further advanced designs until "a closer fit" is available of U. S. manufacturing plans. "The U. S. credited through watching Britain used its level—the U. K. is now now wait for the California specifications to crystallize." —Robert H. Wood

Time-Saver FOR EXECUTIVES

Fast-Thinker FOR PILOTS

- Sperry's Zero Reader* Flight Director is a "Yes-thinking" calculator that saves valuable time for busy executives and removes pilots of complex mental calculations. That's why more and more progressive corporations—large and small—are equipping their Executive Aircraft with this versatile instrument.
- The Flight Director not only is used for en route flying but makes the

difficult task of manual approaches an effortless Landing System in routine procedures. Thus, business men are insured of leaving approximations and no rough estimates.

The Flight Director makes altitude, altitude, heading and radio path signals and combines this information in a simple two-element indication. The pilot simply flies "zero" using the voice

instruction whether he is manually controlling or making landing approaches. This simplified manual control reduces pilot fatigue and permits the pilot to devote more time to other duties.

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types of problems

Here are ten typical fastening problems. One device, the ELASTIC STOP nut, solves them all—without additional parts or operations. Deliberately undersized in relation to bolt diameter, the red elastic collar grips the bolt with a perfect fit, exerting a continuing self-locking pressure against the threads, and holding the nut securely in place at any point on the bolt. It also provides a tight seal against the bolt threads, which prevents seepage and wear-producing axial play. And because the bolt threads are protected against moisture from without, the nuts are not "frozen" to the bolt by corrosion.

ELASTIC STOP nuts stay tight, right where you put them, in spite of vibration and stress reversals. Yet they are not jammed in place, and can be removed with a wrench and reused many times.

For further information on ESNA self-locking fasteners, mail the coupon below.

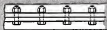
TIGHTENED AGAINST THE WORK



Wherever a vibration or impact proof bolted connection is desired.



On all electrical terminals subjected to vibration in transit or operation.



For uniform and precise prestressing of multiple bolt assemblies . . . adjusted by predetermined wrench torques.

LOCATED ANYWHERE ON THE BOLT



Spring-mounted connections or dynamic balancing, where nut must stay put yet be easily adjusted.



On make-and-break adjustment studs where accurate contact gaps are required.



For bolted connections requiring predetermined play.



For rubber-insulated and cushion mountings where the nut must not work up or down.

FOR MANY SPECIAL APPLICATIONS



To seal bolt threads where elimination of leakage past stud threads is necessary.



To seal bolt threads where it is necessary to protect them from corroding elements.



To obtain delicate adjustments for applications such as bearing lock-nuts where precise adjustment is essential.

ELASTIC STOP NUT CORPORATION OF AMERICA



Dept. N41-P35, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information

- ☐ Elastic Stop nut bulletin ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____